

## Karnozin EXTRA® alters mitochondrial respiration through its activity on oxidative phosphorylation

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### Abstract

Carnosine, an endogenous peptide, has been demonstrated to play an antitumorigenic role in certain types of cancer, suppressing glycolysis in cultured tumour cells<sup>1,2</sup>. Recent evidence suggests that l-carnosine can interfere with oxidative phosphorylation as well<sup>3</sup>. However, its underlying mechanism is unclear. The capsule of Karnozin EXTRA® (Carnomed) is a unique patented formula of l-carnosine, in combination with vitamin E, coenzyme Q10, l-carnitine, northern blueberries extract and grape seed extract.

This food supplement was tested on two continuous cell lines with different energy pathways, MRC-5 (human embryo lung fibroblasts) and MCF-7 (human breast cancer cells), to evaluate its effects on mitochondrial respiration and certain mitochondrial respiratory chain complexes of the cells. Cells were treated for 24 hours with different concentrations of aqueous solution of the capsule Karnozin EXTRA® (Carnomed) corresponding to concentrations of pure l-carnosine from the capsule of 2, 5, and 10 mM. Afterwards, we investigated basal respiration of intact cells and the activities of mitochondrial respiratory chain complexes I, II and IV. All measurements were performed using the Hansatech Oxygraph+ instrument (England).

The results showed that Karnozin EXTRA® (Carnomed) exerted a significant reduction in the oxygen consumption in both cell lines in a dose-dependent manner. Moreover, the activities of mitochondrial electron transport chain complexes I, II and IV in both cell lines were compromised. The strongest inhibitory action was shown on the activity of complex II of mitochondrial electron transport chain.

The present study highlights a novel role of this capsule as a regulator of tested cells energy metabolism both in the anaerobic and aerobic pathways, which may give renewed impetus for its development as antitumor agent.



### Speaker Publications:

1. Renner C, Asperger A, Seyffarth A, Meixensberger J, Gebhardt R, Gaunitz F. Carnosine inhibits ATP production in cells from malignant glioma. *Neurological research*. 2010;32(1):101-5.
2. Renner C, Zemitzsch N, Fuchs B, Geiger KD, Hermes M, Hengstler J, Gebhardt R, Meixensberger J, Gaunitz F. Carnosine retards tumor growth in vivo in an NIH3T3-HER2/neu mouse model. *Molecular cancer*. 2010;9(1):2.
3. Shen Y, Yang J, Li J, Shi X, Ouyang L, Tian Y, Lu J. Carnosine inhibits the proliferation of human gastric cancer SGC-7901 cells through both of the mitochondrial respiration and glycolysis pathways. *PloS one*. 2014;9(8):e104632.

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